Math 132
Worksheet 10 – April 3, 2012

Name _____

1. The "floor" function $\lfloor x \rfloor$ is equal to the greatest integer $\leq x$. Thus,

$$3 = \lfloor 3 \rfloor = \lfloor \pi \rfloor = \lfloor 3.9999 \rfloor.$$

Find $\lim_{i \to \infty} \frac{\lfloor i \rfloor}{i \cdot \ln i}$. (Hint: Sandwich Theorem!)

2. How many terms are needed in the partial sum approximation to $\sum_{i=1}^{\infty} \frac{1}{i^4}$ to guarantee the error to be less than 0.05?

3. It is easy to use the Direct Comparison test to show that $\sum_{i=1}^{\infty} \frac{\sin^2 i}{i^2}$ converges. The purpose of this problem is to discuss the use of Limit Comparison to show convergence of this series.

   (a) Explain why Limit Comparison with $\sum_{i=1}^{\infty} \frac{1}{i^2}$ is inconclusive.

   (b) For some other value of $p$, use Limit Comparison with $\sum_{i=1}^{\infty} \frac{1}{i^p}$ to show convergence.

4. Show convergence or divergence of $\sum_{i=1}^{\infty} \frac{\sin^2 i}{i^2 - 10}$.